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ABSTRACT

The process of learning with respect to age is discussed. Learning may be defined as the acquisition of information or skills. Three non-cognitive factors varying with age are loss of speed, health, and motivation. Studies on learning in relation to age have not controlled for non-learning factors. Perceptual and psychomotor studies are not consistent in indicating whether learning rates vary with age. There are clear performance differences which are independent of learning ability. Other research has compared age groups with respect to the relation between immediate and old recall and have found that immediate recall falls off more rapidly than does old recall with age. The available research suggests that both learning and non-cognitive deficits occur with age. Three problems face the educators of older people. These are (1) What do they want to do? (2) What can be done to motivate them? and (3) What principles can be carried out in educating the aged. Seven principles have been developed. These include: (1) Work through existing senior citizen centers and groups to satisfy the needs of the elderly as they see them; (2) Establish a curriculum that recognizes the need for immediate rewards and useful courses; (3) Utilize instructors who are knowledgeable in the field of aging; (4) Provide courses at minimal cost; (5) Offer courses in safe, convenient location; (6) Avoid formal arrangements; and (7) Insure that participants understand that their success depends upon their commitment. (Author/CK)

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AGING AND LEARNING

I. A Review of Experimental Studies

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I. A Review of Experimental Studies

Learning may be defined as the acquisition of information or skills. In the analysis of learning, a distinction is made between the internal process and the external act. The reason for this is that we see the act and not the process.

We infer from an improvement in performance that learning has taken place. This inference may be in error. What may have produced the improvement in performance may not have been learning as such, but an improvement in non-cognitive factors about which we are unaware. For instance, improvement in performance may be due to increased motivation or to better health. Conversely, learning may have taken place in the absence of an observed improved performance. Noncognitive factors may be operating against improvement. If motivation is low and health is poor, then what was learned may not be manifest.

These considerations are important in evaluating aging studies on learning. If age groups differ with respect to the relevant non-cognitive factors, then even if they do not differ in learning ability, they will differ in performance. It is difficult to separate the contributions to performance of the cognitive and non-cognitive elements, but without such separations it would not be possible to make clear the cognitive changes which may occur in later life and the psychophysiological alterations which may indicate these changes.[1]

Three non-cognitive factors as they relate to differences with age in learning are loss of speed, health, and motivation. There is a loss of speed of response with age, and the more the learned response involves speed, the greater the penalty for the older person.

(Canestrari, 1963; Eisdorfer, Axelrod, and Wilkie, 1963; Arenberg, 1965; Eisdorfer, 1965; Arenberg, 1967; and Taub, 1967.) Data which bear upon the relationship between physical health, motive states, and learning performances are inconclusive (Botwinick, 1967).

Studies on learning in relation to age have generally not controlled for non-learning factors. Botwinick (1967) classes these studies into six mutually inclusive categories: conditioning, verbal learning, rigidity in learning, perceptual and psychomotor learning, practical learning, and memory.[2]

Several conditioning studies (Marinesco and Kreindler, 1934; Braun and Geiselhart, 1959; Kimble and Pennypacker, 1963) clearly point to a slowness of acquisition of the conditioned response (CR) with advancing age. The data on extinction are inconsistent but they do seem to indicate that the nature of the response may be a factor. For instance, in classical conditioning of involuntary responses, CRs are readily extinguished in advanced age (Braun and Geiselhart, 1959; Botwinick and Kornetsky, 1960). While, with instrumental conditioning (with animals), resistance to extinction is high (Seneberg and Kline, 1958; Battig and Grandjean, 1959).

Acquisition is also relatively slow in later life in the learning of verbal material (Ruch, 1934; Gilbert, 1935, 1941; Canestrari, 1963; and Arenberg, 1965). However, it is still not clear whether the deficit is in the learning or performance aspect of the behavior, or with both. Botwinick's (1967) interpretation is that the data suggest an age decline in both aspects, with the performance aspect being more easily and clearly demonstrated.

It has been suggested (Ruch, 1934) that the primary deficit is neither in the learning nor in the performance, but in the modifying effects of prior experience. The idea is not that the older person has a limited ability to learn, but that he is too rigid to do so. Botwinick (1967) after his review of the diverse human and animal studies of rigidity in learning[3] stated that when an age decrement was found, it tended to be an overall decline rather than a decrement specific to rigidity and added that when there was an indication of an age-related deficit in "rigidity" in learning, this deficit tended to be marginal and was a function of the original learning. Botwinick (1967) concluded that research evidence that rigidity in old age produces a learning deficit does not seem impressive.

Perceptual and psychomotor studies are not consistent in indicating whether learning rates are different in older and younger subjects. In most cases, however, there are clear performance differences which seem to be independent of learning ability. Botwinick, Robbin, and Brinley (1960), Clement (1962), Gladis (1964), and Noble, Baker, and Jones (1964) found older adults performed at a level lower than younger subjects.

The literature on practical learning and age generally indicates that the performances of older subjects are poorer than those of younger subjects, although all age groups can learn. (Shooter, Schonfield, King, and Welford, 1956; Belbin, 1958; Moore, 1965; and Downs, 1965). Some methods of training that are especially helpful to the elderly are those that eliminate or minimize those features of the task which relate to functions that decline with age. (Belbin, 1958; Belbin and Downs, 1964; and Moore, 1965.)

Studies on memory and age are of two types. One type of memory study involves the recall of experiences which have taken place prior to the time of the investigation. This would include recall of recent events and would also include recall of the distant past (old memories). The second type of memory study involves the recall of material which was learned at the time of the investigation. It involves teaching subjects new material and then testing for recall soon afterward. The tests may be of immediate recall or longer, delayed recall.

One branch of the research has investigated whether it is the ability of immediate recall or delayed recall which declines more with age. Several studies (Jones, Conrad, and Horn, 1928; Gilbert, 1941; Bromley, 1958; Jones, 1959; and Peak, 1968) have found that ability in immediate recall diminishes in later life. According to Botwinick (1967), the results with respect to delayed recall need to be better validated before being accepted as fact. Botwinick (1967) emphasizes that what has been accepted as a deficit of the aged in ability to retain information over periods of time may be an age deficit in the ability to acquire information in the first place.

Another branch of the research has compared age groups with respect to the relation between immediate and old recall. Generally, studies in this area have concluded that ability in immediate recall falls off more rapidly with advancing age than does ability in old recall. (Shakow, Dolkart, and Goldman, 1941; Van Zonneveld, 1958; and Klonoff and Kennedy, 1965.)

In evaluating the literature on the role of age in relation to immediate and old recall, it would seem that it is necessary to differentiate old

memories that are practiced from those that are not. To state that the ability to recall old memories does not decline with age as rapidly as does the ability to recall new material may not be saying much more than that old material that has been constantly rehearsed or practiced is not forgotten as readily by the elderly as are recent and relatively unrehearsed memories.

In summary, studies exploring the relation between learning and aging consistently have found that elderly persons retain their ability to learn. However, the same studies generally showed that learning performances decline with increasing age. There is some question as to whether this decline is due to a relative inability to learn, or to non-cognitive factors which change with age. Botwinick (1967) concludes that an adequate basis to resolve this doubt does not seem available but that a common opinion is that changes with age in ability to learn are small under most circumstances. Birren (1964) concurs and states that when age-related differences occur, they seem to be more readily attributed to processes of perception, set, attention, motivation, and the physiological state of the organism (including that of disease states) than to a change in the primary capacity to learn.

Little research has been conducted in order to test the notion that non-cognitive factors rather than learning factors produce performance deficits with age. The available research seems to suggest that both learning and non-cognitive deficits may occur (Botwinick, 1967).

II. Teaching the Older Adult

Three significant problems face every educational endeavor for older adults. First, what do they want to do--what is the felt need that the enterprise can respond to? Second, what can be done to motivate the broad range of adults, especially the older ones, to utilize an educational possibility? Third, and most important, what principles can be followed in carrying out an educational program which responds to these felt needs of older people?

In answer to the third question, the seven principles below have been developed out of the experience and research of the Mayor's Office for Senior Citizens in Chicago. While they do not pretend to be the ultimate guide to teaching older adults, they have been valuable in a number of different situations and have added to the success of educational programs on a number of levels.

The principles listed below will give you a short, concise guide to teaching older adults. Following the principles are seven corresponding short paragraphs that expand the original statements and give basic bibliographical references for those interested in further investigation of the problem.

1. Work through existing senior citizen centers, groups and clubs to identify and satisfy the <u>needs</u> of the older adults as <u>they</u> see them.
2. Establish a curriculum that recognizes the need for immediate rewards, useful courses and specific content.
3. Utilize instructors who are knowledgeable in the field of aging, and specifically informed on the older adult in the geographic area to be served.
4. Provide the courses at a minimal cost, just enough to establish a commitment by the participant without creating a burden.
5. Bring the courses to the community in easily accessible, safe, daytime classrooms that utilize a seminar arrangement.

6. Avoid the formal, restrictive arrangements that often obtain in adult education.

7. Finally, insure that the participants fully understand the purposes of the courses, the value of the instruction and the commitment of all involved to the success of each individual.

1. "Work through existing centers...," -- the factors militating against older people participating in an educational experience are many and varied. One positive way to ameliorate these difficulties lies in providing a group environment for learning. Give classes where older persons are already gathered for activities. It is much easier to get an expression of the group needs as they see them if you already have them gathered together, an especially important factor. A person with 65 or 70 years of life experience is not easily convinced that a study of Freudian theory is important, when he or she is concerned with individual psychological changes. In short, the older adult will respond to his educational needs only if the educational institution will provide the means to do it. (See Appendix D 3, 5, 6, 7, 9, 11, 13, 16, 17, 19, 21, 23, 25)

2. "Establish a curriculum...," -- the three most essential formal needs of older people in an educational experience are immediate or short term rewards to reinforce the learning experience, courses that have an immediately useful aspect to them, and courses that have a specific, as opposed to a broad, abstract content. The older person realizes his own mortality and does not plan in terms of long range goals. In addition, he or she needs oftentimes to be convinced of the value of intellectual stimulation. The short term reward, combined with immediately satisfying course material, will insure that the experience is a gratifying one for both student and leader. (See Appendix D 3, 5, 7, 8, 9, 13, 16, 17, 19, 24)

3. "Utilize instructors who are knowledgeable in the field of aging...," --

this is perhaps the most essential element of the seven cited in this paper. The person teaching or leading an education experience for older people must be fully aware of both the strong and the weak points of older people (see the first section of this publication.) That leader must be able to use the strengths of the older person to establish the nature of the instruction and can not try simply to force a pattern of instruction on an unwilling audience. (See Appendix D 1, 2, 3, 7, 9, 15, 18, 20, 23, 25)

4. "Provide the courses at a minimal cost...," -- since we are all aware of the financial difficulties of older people, courses must be provided at an absolutely minimal cost. Some fee structure should be provided, but courses should be free if that fee would impose any restriction on access. The caveat here is not to make the free tuition seem to be charity. (See Appendix D 8, 9, 14, 17)

5. "Bring the course to the community in easily accessible classrooms...," -- especially in urban areas, where the crime rates are high, the classes must be presented in a safe atmosphere. Additionally, the day-time class has great advantages of accessibility by public transportation, and day-time classes allow the older person to structure meaningful activity into his daily schedule. The seminar also adds to the desireability of the course by allowing the older person to make an intellectual investment and commitment to the course. (See Appendix D 5, 12, 14, 22)

6. "Avoid the...restrictive arrangements...," -- again, the need is to take the course of instruction out of the elementary school teacher/pupil model so widely used in adult education, and put it on a more sophisticated basis of mutual respect. Those people teaching older adults must always be aware of the great variety of life experiences one has in 65 to 70 years and must be able to use those life experiences to strengthen the course. (See

Appendix D 5, 9, 10, 14, 16, 17, 19, 23)

7. "Finally, insure that the participants fully understand...,"
-- so often classes for older people are run with a vague, loose structure that leads the older person in a circular, non-goal oriented direction. The exact nature and purpose of the course must be clearly stated. At the same time, the participants must feel that they are getting more than just information from a course of instruction. Older people, generally, are neglected and forgotten in our society. They are consistently denied income, work, and a great variety of benefits that are their right in our society. A small, but important, method of reinstating some of the esteem lost through this neglect lies in making each participant know that they are valuable, that their opinions and ideas are important, and that their participation is meaningful. (See Appendix D 3, 9, 10, 17, 22, 23, 25)

APPENDIX

A. Types of Learning (A Review of Experimental Studies)

1. Classical Conditioning.

Classical conditioning involves the acquisition of a response (CR) to a neutral stimulus (CS). The abbreviation UCS stands for unconditioned stimulus or a stimulus which when it occurs elicits an unconditioned response (UCR). The abbreviation CS stands for conditioned stimulus. A conditioned stimulus is labeled a neutral stimulus because initially it does not elicit a response. However, through conditioning, the CS comes to elicit a conditioned response (CR). A diagram of the typical classical conditioning experiment follows:

(1) UCS elicits UCR

(2) CS is repeatedly paired with UCS

(3) CS alone elicits CR

Thus, to begin with, the UCS elicits an UCR. Then the neutral stimulus (CS) after repeated pairings with the UCS comes to elicit a conditioned response (CR). The CR is similar but not identical to the UCR.

2. Instrumental Conditioning.

In instrumental conditioning, the subject must make the desired response prior to receiving reinforcement. Because of the reflexive nature of classically conditioned responses, operant behavior is often theorized as voluntary, and classically conditioned behavior labeled involuntary. Schematically, operant conditioning appears as follows:

(1) Subject makes R (desired response).

(2) R is followed by S^{R} (reinforcement).

(3) R has higher probability of occurence.

3. Verbal Learning.

Among the studies of verbal learning most frequently undertaken is the learning of paired associates. In brief, the experimenter presents a series of paired words to the subject, whose job it is to learn the pairing. When the pairing is learned, the subject is able to supply the second word of the pair when the first word is presented.

Paired-associate learning is thought to be divisible into two phases: a response learning phase and an associative phase. The response learning phase is thought to precede the associative phase since the response (the second word of the pair) must be available before it can be linked to the first word of the pair.[4]

4. Rigidity in Learning.

There is a recurrent notion that old age is associated with a relative inability to learn new things, not so much because of a reduced learning capacity, but because of prior learning which persists even when no longer effective. The more incompatible the new is with the old, the more the elderly are presumed to be at a disadvantage.

There are three related ways to investigate age differences in the effects of prior learning. One way is to present the subject with a learning task which is contrary in some manner to a long-established habit. Age groups are then compared with respect to these effects.[5]

5. Perceptual and Psychomotor Learning.

Studies of perceptual and psychomotor learning require the subject to employ a perceptual and/or motor faculty combined with a thought process in order to complete a task successfully. Studies of perceptual and psychomotor

learning may be differentiated from studies of problem solving on the basis of complexity. In this study, only relatively simple perceptual and psychomotor learning tasks will be reviewed. Complex, problem solving tasks will not be reviewed.

6. Practical Learning.

Historically, a distinction has been made between a "type of learning that is largely uninfluenced by life's experiences and practical learning which involves compensating adjustments based upon experience."[6] Due to problems in effecting proper controls, the number of studies directed toward practical learning is limited, and often the studies are of dubious scientific merit.

7. Memory.

Learning ability and memory ability are closely related processes. If learning is poor, the amount of information available for retention is limited. Conversely, if memory is poor, then there is no evidence that very much has been learned. In practice, it is difficult to determine whether the primary problem is in the acquisition or in the retention of information.

Traditionally, the memory process has been described as occurring in stages. The first stage of memory has been referred to as impression or registration. The second stage of memory has been labeled retention, which may be thought of as the consolidation of registered inputs. The third stage of memory is recall and recognition.

B. Footnotes (A Review of Experimental Studies)

[1] Paraphrased from Botwinick, 1967, pp. 189-191.

[2] See Appendix for detailed descriptions of these types of learning.

[3] Studies on rigidity in learning and age reviewed by Botwinick included: Snoddy, 1926; Stone, 1929; Ruch, 1934; Kay, 1951; Hanes, 1953; Speakman, 1954; Korchin and Baswoitz, 1957; Gladis and Braun, 1958; Botwinick, Brinley, and Robbin, 1959; Entwisle, 1959; Botwinick, Robbin, and Brinley, 1960; Bernstein, 1961; Birren, 1962; Botwinick, Brinley, and Robbin, 1962; Kay and Sime, 1962; Sime and Kay, 1962; Botwinick, Brinley, and Robbin, 1963; Belbin, Downs, and Moore, 1964; and Canestrari, 1964.

[4] Paraphrased from Botwinick, 1967, pp. 83, 85.

[5] Paraphrased from Botwinick, 1967, pp. 86.

[6] Botwinick, 1967, pp. 98.

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